Technical Memorandum
Comments on the Draft Updated Screening Level Ecological Risk Assessment

Gulfco Marine Maintenance Company
Freeport, Brazoria County, Texas
EPA Identification No. TXD055144539

Remedial Action Contract 2 Full Service
Contract: EP-W-06-004
Task Order: 0006-RSBD-06JZ

Prepared for

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June 2009
Revision: 00
EA Project No. 14342.06

9425203

1.0 INTRODUCTION

This Technical Memorandum summarizes EA Engineering, Science, and Technology, Inc.'s technical review comments for the Draft Updated Screening Level Ecological Risk Assessment (SLERA) prepared by Pastor, Behling & Wheeler, LLC (PBW) for the Gulfco Marine Maintenance Superfund Site (site), located in Freeport, Texas, and submitted to the U.S. Environmental Protection Agency (EPA) on 29 May 2009. The technical review was conducted to assure that the Draft Updated SLERA complies with guidance, to determine if calculations have been performed correctly, and whether appropriate conclusions had been reached. For this review, source material used for modeling (e.g., toxicity reference values [TRVs], ingestion rates, Effects Range-Low [ERL] values, etc.) were examined to assure that the appropriate values were incorporated, verify calculations, and confirm consistency in the values that were carried from appendices into the main text tables. This effort also included review of PBW's November 2005 SLERA and the associated October 2005 technical review comments to verify that these comments had been addressed.

General technical review comments pertaining to the Draft Updated SLERA are provided in Section 2.0. Specific technical review comments associated with the body of the Draft Updated SLERA, including the tables and figures, are provided in Section 3.0. Section 4.0 provides a summary based on the outcome of the technical review.

2.0 GENERAL TECHNICAL REVIEW COMMENTS

General Comment 1.

An Executive Summary and List of Acronyms is recommended for the document.

General Comment 2.

Inappropriate TRVs have been used for certain receptors in food-web risk calculations. Unadjusted mammalian and avian TRVs have been used to directly assess food-web risks to crustaceans (fiddler crab) and fish (black drum and spotted sea trout) to assess sediment exposure; and for the rat snake to assess exposure to soil. There is no scientific evidence that direct cross-phyla application of TRVs is appropriate, and any estimated food-web risks based on this assumption are expected to be erroneous. The only approach available for cross-phyla application of TRVs from risk assessment guidance involves large safety factors (Ford et al. 1992); these factors typically provide unrealistic results. The food web calculations for crustaceans, fish, and snakes, and the resulting risk estimates should be eliminated from the document. Rather, the following approach is recommended for the assessment of risks to these receptors:

a. Fiddler crab – The National Oceanic and Atmospheric Administration's ERL and Effects Range-Medium (ERM) values are designed to be protective of benthic organisms; these values provide a more reasonable comparison than the food-web

basis currently presented. In addition, water quality criteria (WQC) are designed for the protection of not only fish, but all aquatic organisms; consequently, the use of WQC would also be appropriate for the fiddler crab.

b. Fish (black drum and spotted sea trout) - The use of WQC is appropriate for estimation of risks to these receptors, especially given the role direct contact and gill uptake play in aquatic exposures.
c. Rat snake - There are no appropriate TRVs for assessment of risks to the rat snake. The best that can be done for this receptor is a qualitative assessment based on a weight-of-evidence approach that considers the following questions: Is there qualitative toxicological information that indicates source-related chemicals may produce toxic effects on reptiles? Is the habitat appropriate? Are there appropriate food resources available to support a rat snake population? Are there other stressors (e.g., the road) that may pose more risk than chemical contaminants?

General Comment 3.

Dose calculations for the coyote, hawk, and green heron only take into account the dose from food ingestion and not soil (sediment) ingestion. A statement is made in the document that these doses have not been included because the proportion of incidental soil ingestion relative to food ingestion is small (2%). While the dose proportion may be small, it is important to take into account chemical dose from the incidental soil ingestion. Dose is a function of not only ingestion rate, but also of chemical concentration in the material ingested. Because concentrations of some chemicals are likely to be much higher in soil than in food, a disproportionate dose can come from soil. It is necessary to include the incidental dose from soil to the coyote and hawk, and sediment to the green heron in the dose calculations.

General Comment 4.

Dose calculations have intermingled wet-weight ingestion rates with dry-weight food concentrations. Food ingestion rates presented in Chapter 5 from EPA (1999) are based on wet weight, but the food concentrations calculated are in dry weight. This will tend to significantly overestimate the chemical dose from food. Either the ingestion rate or the food concentration should be corrected for percent moisture, which can be found in either EPA (1999) or EPA (1993).

General Comment 5.

There are missing dose calculations for selected contaminants of potential ecological concern (COPECs) identified in Table 21. Acenaphthylene, dieldrin, endrin, and endrin ketone are shown as COPECs in North Area Soil in Table 21, but concentrations of zero have been entered into the Appendix D dose calculations, resulting in perceived acceptable risk. For the Intercoastal Waterway Sediment, Appendix G shows a concentration of zero for low-molecular-weight polycyclic aromatic hydrocarbons (LPAHs), but LPAHs are listed as a COPEC. For the Pond Sediment, Appendix I presents no concentration for LPAHs, and

phenanthrene, which has been identified as a COPEC in Table 21, is not included in the risk calculations.

General Comment 6.

In all instances where no readily available bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF) was available, a food concentration of zero was incorporated into the dose calculations. The absence of a BAF does not preclude the potential for bioaccumulation of the chemical into food. Assuming a food concentration of zero will minimize the dose and likely underestimate potential risks. If appropriate accumulation factors cannot be derived from the scientific literature, a default BAF of 1 should be adopted, with the soil concentration normalized to wet weight of the food item organism and incorporated into the dose calculations. This is consistent with standard methodology adopted by the EPA for screening level applications (i.e., EPA 2005).

General Comment 7.

As noted in Table 21 and discussed elsewhere, "Surface water is not included in this table because they were evaluated differently given the lack of screening criteria and toxicity reference values." WQC serve as both screening criteria and concentration-based toxicity reference values (similar to ERLs or ERMs). In addition, the WQC can be used to directly assess potential risks to the fish receptors (black drum and spotted sea trout) and the fiddler crab. Consequently, surface water comparisons to WQC should be added to Table 21 and treated as appropriate TRVs in the document.

General Comment 8.

Background Comparisons: The following statement is made in Section 2.7: "EPA guidance for conducting SLERAs (EPA, 2001) recommends that comparison with background generally not be used to remove compounds from further evaluation in order to conservatively ensure that site risks are adequately characterized. This recommendation is based on the premise that the SLERA is often conducted on limited data set prior to a comprehensive site characterization." Subsequently, the background comparison is used to eliminate contaminants of interest (COI) from the COPECs. The exact language from EPA (2001) is as follows: "While contaminants of concern may be removed from further assessment through comparison with toxicological benchmarks, comparison with background levels generally cannot be used to remove contaminants of concern owing to the need to fully characterize site risk. Such comparisons, however, can be used effectively to focus the baseline risk assessment, if needed." The clear implication of this guidance is that the elimination of COPECs based on the background comparisons discussed in this section is not appropriate. All COIs should be carried through into Step 2, and if potential risk from one of the COIs is demonstrated in Step 2, background comparisons can be used in the weight-of-evidence approach used to determine the need for proceeding to a baseline ecological risk assessment. Consequently, while the background comparison is appropriate, it should be performed at the end of Step 2, not to eliminate COPECs in Step 1.

3.0 SPECIFIC TECHNICAL REVIEW COMMENTS

The following technical review comments (Specific Comments 1 through 8) are associated with the body of the Draft Updated SLERA, including the tables and figures.

1. **Tables 6-9**

   Footnote 4 on all of these tables reads "From Table 2 of EPA's EcoTox Update January, 2006." Footnote 4 should read "From Table 2 of EPA's EcoTox Update January, 1996."

2. **Section 2.5.3, page 13**

   Only one measurement endpoint has been identified: comparison of soil, sediment, and surface water concentrations to appropriate ecological benchmarks. This measurement endpoint only applies to protection of fish and shellfish, soil invertebrates, and benthic organisms. A second measurement endpoint applies to the mammalian and avian food web dose calculations and comparison with TRVs.

3. **Tables 18 and 19 Assessment and Measurement Endpoints**

   The measurement endpoint for mammalian and avian receptors is incorrect, and should reflect the calculation of chemical dose and comparison to TRVs, not comparison of measured concentrations to benchmark screening values. Also, as noted in General Comment 1, dose calculations for fish, the rat snake, and the fiddler crab are not scientifically sound due to the absence of appropriate TRVs. For fish and crab, the measurement endpoints should be redefined as the comparison of surface water or sediment concentrations to benchmarks.

4. **Section 2.7, page 19 (also see General Comment 8)**

   To be consistent with EPA guidance, move the background concentration comparisons to the end of Step 2, and do not eliminate COIs from becoming COPECs at the end of Step 1.

5. **Section 3.1.1, page 21**

   Under the heading "Detritivores, Invertebrates, and Terrestrial Plants," only detritivores (invertebrates) are discussed; terrestrial plants were not addressed under this section.

6. **Section 3.4.8 Surface Water, page 31**

   As discussed in General Comment 7, WQC qualify as benchmark screening values, and should be presented similarly to the hazard quotient presentations for all other media. While it is true that dietary exposure to contaminants is not considered in WQC, the direct toxic effects to aquatic organisms are better assessed by incorporating gill uptake and direct contact as exposure pathways, which is what has been used to establish the WQC. Further,

the extensive discussion based on the concentration in water having 50% chance of causing death to aquatic life, or LC_{50}, related to these contaminants is not appropriate; evaluation of toxicological data based on chronic endpoints is more appropriate. It is suggested that LC_{50} discussions be replaced with more appropriate chronic endpoints.

7. **Section 5.1.1, pages 40-41**

   It is recommended that the ERL/ERM results be interpreted using recommendations found in Long and MacDonald (1998). It is likely that, if these results were interpreted using their recommendations, these areas would be classified a medium-low priority site, indicative of a site that has a relatively low likelihood of resulting in toxicity to benthic receptors.

8. **Plate 1**

   Zones 1 through 4 are presented in the Intracoastal Waterway and grid patterns are presented in the north and south land areas. However, there is no discussion of these zones or grids in the text. These zones and grid features should be referenced in the text.

4.0 SUMMARY

In summary:

1. Do not screen contaminants out using background prior to Step 2; address background comparisons in the weight of evidence presented for the Scientific/Management Decision Point (SMDP).

2. Utilize WQC as appropriate screening values for which hazard quotients can be calculated in the same way sediment ERLs and food web dose calculations were used.

3. Correct the identified food-web modeling problems, including use of species- and pathway-appropriate TRVs for fish, crab, and snake; incorporation of a dose from soil for selected receptors; correction of wet weight/dry weight consistency issues within food web models; and utilization of a surrogate food concentration (such as total soil

   concentration on a food-item wet weight basis) when no BAFs or BSAFs can be located. Finally, all calculations should undergo a thorough quality assurance review to ensure that there are no missing analytes/concentrations.

Correction of these issues is unlikely to change the SLERA conclusion that risks to populations of ecological receptors at the site are acceptable, but will place the conclusion in the appropriate regulatory context.

REFERENCES

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